REMARKS

Claims 1-8 are pending in this application. Claims 4 and 5 have been amended herein. The applicants respectfully submit that no new matter has been added. It is believed that this Amendment is fully responsive to the Office Action dated **February 23, 2005**. Support for the amendments to the claims is discussed below.

The specification is objected to because there are no headings, such as "Background of the Invention", "Summary of the Invention", etc. (Office action page 2)

The objection is respectfully traversed. The specification has a "Background of the Invention" heading on page 1, line 3, a "Brief Summary of the Invention" heading on page 4, line 6, and so forth.

Claims 4 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. (Office action page 2)

The rejection of claims 4 and 5 is overcome by the amendments to claims 4 and 5.

The Examiner refers to the recitation in claim 4 that the composition "contains (meth)acrylate which dissolves the polymeric dispersant." In the amendment, claim 4 has been amended to depend from claim 3, which recites that the composition contains a photopolymerizable compound which dissolves the polymeric dispersant. Claim 4 has been amended to recite that the photopolymerizable

compound is a (meth)acrylate. Claim 5 has been amended to recite that the photopolymerizable compound is 2-hydroxy-3-phenoxypropyl acrylate.

Support for this amendment can be found in the original wording of the claims, and in the disclosure in the specification on page 13, line 3, and page 14, line 1.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/46323 in view of Emmons et al. (6,080,802). (Office action page 2)

Applicant respectfully notes that Emmons et al. '802 has not been cited in the Information Disclosure Statements submitted by the Applicant, nor in the Examiner's PTO-892. Applicant requests that the Examiner make this document of record in a PTO-892.

The rejection of claims 1-8 is respectfully traversed.

The ultraviolet-curable ink compositions for ink jet recording of the present invention is an ink composition, which comprises titanium oxide, a polymeric dispersant having a basic functional group, a photopolymerizable compound and a photopolymerization initiator. The titanium oxide is surface-treated with silica and alumina, and the weight of the silica, which coexists with the titanium oxide, is larger than that of the alumina.

In the present invention, the polymeric dispersant is adsorbed on the surface of the surface-treated titanium oxide strongly, due to the effect of the combined use of the polymeric dispersant having a basic functional group and the surface-treated titanium oxide in the composition. As a

result, a stable dispersing effect of the titanium oxide can be obtained due to the repulsive force achieved by the steric hindrance that is caused by the adsorption of the polymeric dispersant.

Due to the result of the stable dispersing effect, the present invention can achieve an excellent ultraviolet-curable ink composition which has superior characteristics such as excellent ejecting property, covering property and curability, and particularly has very excellent ejection stability.

On the other hand, the invention disclosed in WO 02/46323 relates to an ink composition for ink-jet-printing wherein an ultraviolet-curable ink is printed on a circuit board. The ink composition comprises reactive monomers and oligomers, at least one pigment, at least one photoinitiator, and at least one additive. WO 02/46323 discloses that the ink composition has a low viscosity at high temperatures, a high viscosity at room temperature, and heat resistance wherein the composition is able to withstand dipping in a solder bath. Furthermore, WO 02/46323 discloses that titanium oxide coated with functional groups can be used as a pigment, and also discloses adding of a dispersing agent. Some examples of the dispersing agent are cited in WO 02/46323 on page 7, last paragraph.

However, there is no specific disclosure about the desirable state of the surface of the titanium oxide in WO 02/46323. Furthermore, there is no disclosure about surface treatment of the titanium oxide with silica nor surface treatment of the titanium oxide with alumina.

Further, although some dispersing agents and some product names thereof are disclosed in WO 02/46323, there is no specific disclosure in the reference of the limitation of claim 1 that a polymeric dispersant having a basic functional group should be used. Moreover, there is no

disclosure of the specific combination of the polymeric dispersant having a basic functional group and titanium oxide on which is carried out a specific surface-treatment.

Applicant therefore submits that the limitations of claim 1 are not disclosed or suggested by WO 02/46323.

The invention disclosed in the reference Emmons et al. '802 relates to a process for preparing an aqueous dispersion of composite particles wherein polymeric latex particles are adsorbed to titanium oxide. Furthermore, Emmons et al. '802 discloses that, in order to achieve good adsorption, the surface potential of the titanium oxide particles can be controlled by providing a coating of alumina, silica or a mixture of alumina and silica on the particles.

However, in Emmons et al. '802, there is no disclosure that the weight of the silica, which coexists with the titanium oxide, is larger than that of the alumina. Furthermore, there is no disclosure at all about a polymeric dispersant having a basic functional group, which should be used in combination with the surface-treated titanium oxide.

The process for preparing an aqueous dispersion of Emmons et al. '802 is a process for dispersing the titanium oxide particles in an aqueous medium. Since the ultraviolet-curable ink composition of WO 02/46323 (like the ultraviolet-curable ink composition of the present invention) is a non-aqueous type composition, Applicant submits that the content of a non-reactive solvent in the composition is not suitable. Accordingly, the invention of Emmons et al. '802 is not an invention which is easily applicable to the composition of WO 02/46323. That is, the aqueous dispersion of reference Emmons et al. '802 prevents an aggregation of particles due to the electric

repulsive force caused by the surface charge of the dispersed particles. On the other hand, the ink compositions of reference WO 02/46323 can prevent an aggregation of particles due to the repulsive force caused by the steric hindrance which is caused by the polymeric dispersant adsorbing to the particles.

Such a difference in the methods for stable dispersing is based on the difference in mechanisms between the aqueous type dispersion, wherein the prevention of a particle aggregate due to the electric repulsive force is effective, and non-aqueous type dispersion, wherein the prevention of a particle aggregate due to the repulsive force caused by the steric hindrance is effective.

As described above, the control of the surface potential of the titanium oxide particles of reference Emmons et al. '802 is conducted under the premise of using an aqueous type dispersion in which stable dispersion is achieved by the electric repulsive force.

Applicant therefore submits that there is no suggestion or motivation for one of ordinary skill in the art to combine (i) the description regarding the dispersing method for aqueous type dispersion of reference Emmons et al. '802, and (ii) the description of WO 02/46323, in which non-aqueous type compositions are disclosed and the dispersing mechanism thereof is different from that of the aqueous type compositions.

Furthermore, Emmons et al. '802 does not include descriptions regarding an ultraviolet-curable ink composition or ink jet recording at all. Applicant submits that this further argues against any motivation for the combination of WO 02/46323 and Emmons et al. '802.

Moreover, Applicant submits that it is unclear how to technically combine the teachings of WO 02/46323 and Emmons et al. '802, to produce the invention of claim 1, since neither reference discloses the specific relationship of silica and alumina. There is no suggestion for how to conduct a treatment of titanium oxide that would result in the specific relationship between the weight of the silica and the weight of the alumina recited in claim 1.

Furthermore, neither reference WO 02/46323 nor Emmons et al. '802 discloses what type of polymeric dispersant should be combined with surface-treated titanium oxide, as recited in claim 1.

In addition, Applicant submits that the effects such as good dispersion stability and ejection stability, which are achieved by the combination of the surface-treated titanium oxide and the polymeric dispersant having a basic functional group in claim 1, are unexpected over the prior art.

Claims 1-8 are therefore not obvious over WO 02/46323 and Emmons et al. (6,080,802), taken separately or in combination.

Reconsideration of the objections and rejections is therefore respectfully requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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